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Floristic list and biological spectra of plants of Arrang Sire Ghar, Bajaur district of Khyber Pakhtunkhwa, Pakistan

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Abstract

A List of plant species of Bajaur District was set on the basis of field trips conducted in different parts of the year 2018, mostly in, summer, monsoon and winter. The flora comprised of 167 plant species belonging to 40 families. The leading families are Lamiaceae, Solanaceae and Asteraceae, which have 16 species, followed by Mimosaceae and Euphorbiaceae, 11 Zygophyllaceae 8 and Moraceae, with 7 species. Each of the Poaceae, Rhamnaceae, Verbenaceae Papilionaceae, Capparidaceae, Amaranthaceae and Apocynaceae had 3 species, while Buxaceae, Asclepiadaceae, Nyctaginaceae, Oleaceae, Plantaginaceae, Polygonaceae Cannabinaceae, Celastraceae, Cucurbitaceae, Cyperaceae, Liliaceae, Acanthaceae, Aclepidaceae, Meliaceae, Sapindaceae and Sapotaceae had 2 species each. The biological spectrum showed that Hemicryptophytes (05 spp., 9.26%), geophytes (03 spp., 5.56%), chamaephytes (06 spp., 11.1%), Nanophanerophytes (10 spp., 18.5%), megaphanerophytes (14 spp., 25.9%), Therophytes (16 spp., 29.6%). Leaf spectra of plants comprised of nanophylls (5.56%), megaphylls (1.85%) leptophylls (16.7%), microphylls (50%) and mesophylls (25.9%).

Keywords: Floristic list, biological spectra, arang sire ghar, Bajaur district Pakistan

1. Introduction

The ancient name of Bajaur was Nardem, meaning a narrow sprout in Kohistani language. It was its name when the ancient aboriginal people lived here. When the Gabari tribe of Persian origin occupied the land its name was changed to Gabar Swat as both the regions were included in its domain (Ali *et al.*, 2017) ^[1]. The name of Bajaur was coined for the area during Sultanate Period of Dehli, when a ruling tribe by the name of "Arab Bajaur" used to exhort taxes and Tithes on the produce (Baj) from the local people and then send the same to Delhi. So Baj and Aurdan have been mixed in to Bajor or Bajaur (Nisarand Ali, 2012). It is one of the seven Agencies, comprising FATA (Federally Administered Tribal Areas), along with the 5 FRS (Frontier Regions). The geographical boundaries of Bajaur have been shifted more frequently and drastically than any region of Pakistan. There was a time when all the territory between the Kunar River and Panjkora was included in Bajaur (Aziz *et al.*, 2017) ^[4]. A large portion of Mohmand Agency was also included but these days it has been squeezed to its present diminished position. It is bordered by the Kunar province of Afghanistan to its north-west and has a common border of 52 kilometers, starting from the pass of Shahi in the north up to the Nawa pass in the west (Aziz *et al.*, 2018) ^[3]. And this border with Kunar province provides very strategic importance not only to Bajaur but to Pakistan also. To its south-east is located the Malakand Agency; Dir district of KPK (Khyber Pakhtunkhwa) is lying to the north-east and Mohmand Agency to its south-west (Shuaib *et al.*, 2018) ^[17]. The land mass of present day Bajaur Agency is actually perched on a slope and gradually tilting and bending downwardly from the Kunar ridge in the direction of Panjkora River in the east. Drainage of Bajaur is flowing to the east and this flow starts from the dividing ridge's eastern slopes that overlook the Kunar in Afghanistan (Iqbal *et al.*, 2015) ^[8]. Both non-cultivated plants and non-domesticated animals are come in this category. Besides the domestic animals such as cow, buffalo, goat, sheep, ox, horse, donkey, mule, dog, cat and cock, there are numerous other wild animals found in jungles, gorges, ravine and grasslands. Chakor, monal pheasant, cranes, owl, wood pecker, sparrow, black and brown partridges, Porcupine, snake, rabbit, coyote, jackals, crows, lizards, spiders, duck, parrots,

monkeys, long horns and dozens of birds and insects are found in Bajaur Agency. The vegetation in Malasid Hills show great variation with the change in climate and depends upon rains and other geographic factors (Zaman *et al.*, 2018)^[9]. Broadly speaking, the vegetation of Malasid Hills is distributed in these zones, depending upon the elevation (Rahman *et al.*, 2018)^[13]. It comprises many diverse species, particularly of grasses, that tolerate grazing. Moreover several kinds of flowering herbs, shrubs, wild roses and thorns configure thick vegetation. The non- thorny plants heave a sigh of relief in the presence of thorny plants. Roaming among the dales of Malasid, one comes across meadows of sweet- scented hay, the sweet vernal grass (Aziz *et al.*, 2018). This grass contains the aromatic compound Coumarin in great quantities. The dominant plant species of Malasaid Hills are Kharawa (*Cotoneaster affinis*), Khar Ghwag (*Verbascum Thapsus*), Batoora (*Datura Stramonium*), Maraghoonay (*Solanum surratens*), Koteelal (*Wlhania somnifera*), Dambara (*Zanthoxylum armatum*), Markhanai (*Zizipus maurutiana*), Ghwarija (*Indigofera heterantha*), Khona (*Olea ferruginea*), Inzar (*Ficus palmata*), Palosa (*Acacia modesta*), Gooti (*Ajuga bracteosa*), Ghooz (*Juglans reggia*), Seerai (*Quercus incana*), Geeray (*Alnus nitida*), Kwaray (*Berberis lyceum*), Spulmai (*Calatropis procera*), Gandiray (*Nerium oleander*), Sharghashay (*Saccharum spontaneum*), Nakhtar (*Pinus roxburghii*), Chinar (*Platanus orientalis*) and hundreds of others are some of the common species of this zone (Jamal *et al.*, 2018)^[9].

2. Materials and Methods

2.1 Study area

The area of Arang Sire Ghar was selected for vegetation surveying and analysis. This area was not selected for ecological evaluation of vegetation earlier before. The detailed surveys and vegetation sampling accomplished in 2 different. The duration of spring season is from March to June while that of summer is from July to August. During this period the research area tripped regularly. Collection and preservation of plants carried out carefully. In this regard two types of data in above mentioned seasons were recorded. The equipment e.g. GPS, compass, note book, pencil, papers, blot papers and labels carried to the area.

2.2 Selection of sample sites

Selection of sample sites is necessary before the sampling. For this analysis a total four sites were selected which further divided into three territories that is foot hill, mid hill and top hill vegetation on the basis of physiognomy, edaphic factors and altitude. Each site was consisting of forty eight stands of herbs, shrubs and trees, on this account total twelve stands were obtained. To compare the present status of vegetation with that of past the local people and elder nominated and information gathered. Ecological evaluative study conducted and different samples of vegetation and soil collected from each site. The plants was identified by existing collected works (Ali & Qaisar 1971-

2006). These plant was submitted to the Herbarium, Govt Post Graduate Collage Timargara Lower Dir Pakistan Department of Botany. Into different life form the plants were categorized and leaf size classes as follows after Raunkiaer (1934)^[14], Muller and Ellenberg (1974).



Fig 1: Over grazing which leadind to soil erosion in study area



Fig 2: Vegetation of the area

3. Result

A List of plant species of Bajaur District was set on the basis of field trips conducted in different parts of the year 2018, mostly in, summer, monsoon and winter. The flora comprised of 167 plant species belonging to 40 families. The leading families are Lamiaceae, Solanaceae and Asteraceae, which have 16 species, followed by Mimosaceae and Euphorbiaceae, 11 Zygophyllaceae 8 and Moraceae, with 7 species. Each of the Poaceae, Rhamnaceae, Verbenaceae Papilionaceae, Capparidaceae, Amaranthaceae and Apocynaceae had 3 species, while Buxaceae, Asclepiadaceae, Nyctaginaceae, Oleaceae, Plantaginaceae, Polygonaceae Cannabinaceae, Celastraceae, Cucurbitaceae, Cyperaceae, Liliaceae, Acanthaceae, Aclepidaceae, Meliaceae, Sapindaceae and Sapotaceae had 2 species each. The biological spectrum showed that Hemicryptophytes (05 spp., 9.26%), geophytes (03 spp., 5.56%), chamaephytes (06 spp., 11.1%), Nanophanerophytes (10 spp., 18.5%), megaphanerophytes (14 spp., 25.9%), Therophytes (16 spp., 29.6%). Leaf spectra of plants comprised of nanophylls (5.56%), megaphylls (1.85%) leptophylls (16.7%), microphylls (50%) and mesophylls (25.9%).

Table 1: Floristic List and Biological Spectra Of Plants of Arrang Sire Ghar, Bajaur District of Khyber Pakhtonkhwa, Pakistan

S. NO	Species name	Local name	Family	Phenology	Life form	leaf form	Palatibility	Live stock
1	<i>Achyranthes aspera</i> L.	Bachkanda	Amaranthaceae	June-August	THP	MSP	-	-
2	<i>Achillea millefolium</i> L.	Jarai	Asteraceae	April-June	HMP	LTP	+	CGBS
3	<i>Aconitum heterophyllum</i> Wall.ex Royle	Sarbawalay	Ranunculaceae	Septem-October	HMP	MSP	-	-
4	<i>Ajuga breacteosa</i> Wall ex Benth	Gutee	Lamiaceae	April-July	THP	MIC	-	-
5	<i>Adiantum venustum</i> D. Don	Sara kasa	Pteridaceae	May-Aug	GEP	NPL	+	CGBS
6	<i>Allium griffithianum</i> Boiss.	Ogai/Ogakai	Alliaceae	April-May	THP	LTP	+	CGBS
7	<i>Alternanthera pungens</i> Kunth	Drai ghana	Amarathaceae	April-May	CHP	MIC	-	-
8	<i>Amaranthus spinosus</i> L.	Ganaar	Amaranthaceae	March-Septem	CHP	MEG	+	CGBS
9	<i>Amaranthus viridis</i> L.	Chalwaeae	Amaranthaceae	March-Septem	THP	MIC	+	CGBS
10	<i>Anagallis arvensis</i> L.	Gul booti,Shin gulay	Primulaceae	March-Septem	THP	NPL	+	CGBS
11	<i>Androsac rotundifolia</i> Hardwicke	Bragay (gul pensa)	Primulaceae	March-Septem	THP	MIC	+	CGBS
12	<i>Arisaema jacquemontii</i> Blume	Marjarai	Araceae	April-May	GEP	MSP	-	-
13	<i>Artemisia santolinifolia</i> Turcz ex Krasch	Tarkha	Aesteraceae	July-September.	CHP	LTP	G	G
14	<i>Artemisia scorpiia</i> Waldst. & Kitam.	Tarkha (jawkai)	Aesteraceae	April-May	CHP	MIC	G	G
15	<i>Avena sativa</i> L.	Jawdar	Poaceae	May-Aug	THP	LTP	+	CGBS
16	<i>Bergenia ciliata</i> (Haw.) Sternb.	Ghat panrha, zakhm hayat	Saxifragaceae	April-May	GEP	MIC	G	G
17	<i>Boerhvia procumbens</i> Banks ex Roxb.	Ensut	Nyctaginaceae	Septem-Decem	CHP	NPL	+	CGBS
18	<i>Calendula arvensis</i> Linn.	Ziargulay	Asteraceae	April-May	THP	NPL	+	CGBS
19	<i>Carthamus oxycantha</i> M. Bieb.	Shendana	Asteraceae	June-Aug	THP	MIC	-	-
20	<i>Carthamus lanatus</i> L.	Kariza ghana	Compositae	June-Aug	THP	MIC	-	-
21	<i>Cannabis sativa</i> L.	Bhang	Cannabaceae	May-June	THP	NPL	-	-
22	<i>Capsella bursa-pestoris</i> Medic.	Bibi pensa	Brassicaceae	April-May	THP	MIC	+	CGS
23	<i>Carbenia benedicta</i> (Linn) Bth & Hk	Sharai	Asteraceae	April-May	THP	NPL	+	CGBS
24	<i>Centaurea iberica</i> Trev. ex Spreng.	Storay	Asteraceae	April-May	THP	MIC	-	-
25	<i>Chenopodium album</i> Linn.	Khar Sarmay	Chenopodiaceae	June-July	THP	MIC	+	CGBS
26	<i>Chenopodium ambrosiodes</i> L.	Ghra sperkai (Bennakai)	Chenopodiaceae	June-July	THP	MIC	+	CGBS
27	<i>Chenopodium murale</i> L.	Sarmay	Chenopodiaceae	June-July	THP	LTP	+	CGBS
28	<i>Chrozophora tinctoria</i> (Linn) Raffin.	Unknown	Euphorbiaceae	June-Aug	NPP	MIC	-	-
29	<i>Cichorium intybus</i> Linn.	Anja/Han	Asteraceae	April-July	THP	MSP	+	G
30	<i>Cirsium verutum</i> (D. Don) Sprengel	Bangi	Asteraceae	April-July	THP	NPL	-	-
31	<i>Cirsium falconeri</i> (Hook. f.) Petrak	Bangi	Asteraceae	April-July	THP	NPL	-	-
32	<i>Cotoneaster microphylla</i> Wall. ex. Lindl	Skha kharawa	Rosaceae	April-July	PNP	NPL	+	G
33	<i>Cuscuta reflexa</i> Roxb.	Zanzay / mencha botay	Cuscutaceae	July-Septem	P	APL	-	-
34	<i>Cymbogon schoenanthus</i> Spreng.	sargarhay	Poaceae	April-October	HMP	MIC	+	CGBS
35	<i>Cynodon dactylon</i> (Wall.)	Kabal	Poaceae	March-April	HMP	LTP	+	CGBS
36	<i>Cypres rotundus</i> L.	Deela	Cyperaceae	May	HYP	LTP	+	CGBS
37	<i>Duchesnea indica</i> (Andrews) Focke	Balmangai/D zmake tooth	Rosaceae	May-June	HMP	NPL	+	CGBS
38	<i>Echinops cornigerus</i> DC.	Pendosai	Asteraceae		CHP	MSP	+	G
39	<i>Eruca sativa</i> Mill.	Toor pak / Jamama	Brassicaceae	April-May	CH	MSP	+	CGBS
40	<i>Eremostachys superba</i> Royle ex Benth.	Khar dag	Labiatae	April-May	THP	MIC	-	-
41	<i>Euphorbia hirta</i> L.	Zmaki ghooz/Arbay	Euphorbiaceae	Aug-Septem	THP	MIC	-	-
42	<i>Euphorbia helioscopia</i> L.	Arbay /mandarhoo/Arbay	Euphorbiaceae	Aug-Septem	THP	NPL	-	-
43	<i>Euphorbia wallichii</i> Hook. f.	Chatrai /Arghamala/Arbay	Euphorbiaceae	Aug-Septem	THP	NPL	-	-
44	<i>Filago hurdwarica</i> (Wall. ex DC.) Wagenitz	pesho lakai	Asteraceae	April-May	THP	LTP	-	-

45	<i>Fragaria nubicola</i> Lindle. Ex Lacaita	Balmangai	Rosaceae	May-June	THP	MIC	+	CGBS
46	<i>Fumaria indica</i> (Hausskn.) pulley	Shatarah/papraha	Fmariaceae	April-May	THP	LTP	+	CGBS
47	<i>Gogea setifolia</i> Baker	Unknown	Liliaceae	Apri-May	GEP	NPL	+	GS
48	<i>Gogea uliginosa</i> Siehe et Pascher	Unknown	Liliaceae	Apri-May	GEP	LTP	+	GS
49	<i>Geranium ocellatum</i> Camb.	machawonay	Geraniaceae	April-May	THP	MIC	+	CGBS
50	<i>Ipomea purpurea</i> (Linn.) Roth.	Perwatai	Convolvaceae	June-July	THP	MIC	+	CGBS
51	<i>Ixolirion tetaricum</i> (Pall.) Herb.	Shenkai	Iridaceae	Spring	THP	MIC	-	-
52	<i>Lathyrus apaca</i> Linn.	Kurkamanai	Papilionaceae	April-May	THP	NPL	+	CGBS
53	<i>Lathyrus sativus</i> L.	chilog	Papilionaceae	April-May	THP	LTP	+	CGBS
54	<i>Limonium cabulicum</i> (Boiss.) O. Kuntze, Rev. Gen.	Ghwakhakai	Plumbiganaceae	April-May	THP	MIC	+	CGBS
55	<i>Malva neglecta</i> Wallr.	Panderak	Malvaceae	April-August	THP	MIC	+	CGBS
56	<i>Medicago denticulata</i> Willd.	Espeshtaray	Papilionaceae	March-April	THP	LTP	+	CGBS
57	<i>Medicago lupulina</i> L.	Maghy khpa/mardekakh	Papilionaceae	March-April	THP	LTP	+	CGBS
58	<i>Mentha longifolia</i> (L.) Huds.	wenalay	Lamiaceae	July-Septem	GEP	MIP	+	CGBS
59	<i>Mirabilis jalapa</i> Linn.	gule dawodi/gule abbasi	Nyctaginaceae	July-Septem	CHP	MSP	-	-
60	<i>Moraea sisyrinchium</i> (L.) Ker Gawl.	Ghundichar	Iridaceae	April-July	THP	LTP	+	G
61	<i>Nasturtium officinale</i> R. Br.	Tharmera	Brassicaceae	April-May	HMP	MIC	+	CGBS
62	<i>Neslia apiculata</i> Fisch; C. A. Mey. & Ave-Lall	Borchan	Brasicaceae	April-May	THP	MIC	+	CGBS
63	<i>Onosma hispida</i> Wall. ex. G.Don, Gen.	Ghurhapai	Boraginaceae	April-May	HMP	NPL	-	-
64	<i>Ocimum basilicum</i> L.	Ghra kashmalay	Lamiaceae	April-May	CHP	NPL	+	G
65	<i>Oxalis corniculata</i> L.	Triwakay	Oxalidaceae	March-Octob	GEP	MIC	+	CGS
66	<i>Origanum vulgare</i> L.	shamakay	Lamiaceae	May-Septom	CHP	MIC	+	CGBS
67	<i>Parthinum hysterophorus</i> Linn.	Jojay / Ganda bootay	Asteraceae	April-July	HMP	MSP	-	-
68	<i>plantago lanceolata</i> L.	Speghol	Plataginaceae	March-July	THP	NPL	+	CGBS
69	<i>Plantago major</i> L.	Ghwai jabai	Plataginaceae	March-July	GEP	MSP	+	CGBS
70	<i>Polygonatum verticillatum</i> (L.) Allioni	Noor-e-Alam	Asparagaceae	April-May	THP	MSP	-	-
71	<i>Polygonum plebejum</i> R. Br.	Bandakai	Polygonaceae	March-July	THP	MIC	+	CGBS
72	<i>Rumex dentatus</i> L.	Shalkhay	Polygonaceae	April-July	THP	MIP	+	CGBS
73	<i>Salvia moocruftiana</i> Wall	Khar- dag	Lamiaceae	April-August	THP	MSP	-	-
74	<i>Solanum surattense</i> Burm. f.	Marhaghunay	Solanaceae	June-Octob	HMP	NPL	-	-
75	<i>Solanum nigrum</i> L.	Kach-machu	Solanaceae	April-Octob	THP	MIC	+	CGBS
76	<i>Sonchus asper</i> (L.) Hill.	Shodapai	Asteraceae	April-May	THP	MIC	+	CGBS
77	<i>Sonchus oleraceus</i> Linn.	Shodapai	Asteraceae	April-May	THP	NPL	+	CGBS
78	<i>Stellaria media</i> (L.) Vill.	Pos-patay/Olalai	Caryophyllaceae	April-May	THP	LTP	+	CGBS
79	<i>Sylibum marianum</i> (L.) Graertn	Okhanu ghana /wrijakay ghana	Asteraceae	April-May	CHP	MIC	-	-
80	<i>Tagetes minota</i> L.	ghra Hamish gulay	Asteraceae	Through out year	THP	MIC	-	-
81	<i>Taraxacum officinale</i> weber	Boda bodai, alwat, badgir	Asteraceae	April-May	THP	MIC	+	CGBS
82	<i>Teucrium stocksianum</i> Boiss.	Khmazoray/Kwande botay	Lamiaceae	April-May	THP	MIC	-	-
83	<i>Thymus linearis</i> Benth.	Ghra sperkai	Lamiaceae	April-May	HMP	NPL	+	CGS
84	<i>Tribulus terrestris</i> L.	Markundai ghana	Zygophyllaceae	Through out year	HMP	LTP	-	-
85	<i>Tulipa clusiana</i> DC.	Ghantool	Liliaceae	April-May	GEP	LTP	-	-
86	<i>Urtica dioca</i> L	Seezonay	Urticaceae	April-May	THP	MIC	-	-
87	<i>Verbascum thapsus</i> L.	Khar-ghwag	Scrophulariaceae	April-May	THP	MSP	-	-
88	<i>Verbena officinalis</i> L.	shamakay	Verbenaceae	April-May	HMP	MIC	+	CGBS
89	<i>Vicia sativa</i> L.	Arwary	Papilionaceae	April-May	THP	NPL	+	CGBS
90	<i>Viola canescens</i> Wall. ex Roxb.	Banapsha	Violaceae	April-May	THP	MIP	S	S

91	<i>Viola betonicifolia</i> Smith.	Banapsha	Violaceae	April-May	THP	MIC	S	S
92	<i>Xanthium strumarium</i> L.	Gishkay	Asteraceae	May-aug	CHP	MSP	-	-
	Shrubs							
93	<i>Andrachne cordifolia</i> (Wall. ex Decne.) Muell. Arg.	krichai	Anacardiaceae	April-May	THP	MSP	+	CGS
94	<i>Berberis jaeschkeana</i> Schneid.	Soor kwaray	Berberidaceae	April-May	NPP	MIC	+	CGBS
95	<i>Berberis lyceum</i> Royle	Toor kwaray	Berberidaceae	April-May	NPP	MIC	+	CGBS
96	<i>Barleria cristata</i> L.	Bansa	Acanthaceae	April-May	THP	MIC	-	-
97	<i>Berberis calliobotrys</i> Aitch. ex Kochne	Toor kwaray	Berberidaceae	April-May	NPP	MIC	+	CGBS
98	<i>Buddleja crispa</i> Benth.	Speera botai/speera panray	Buddlejaceae	April-May	NPP	MIC	-	-
99	<i>Calotropis procera</i> (Willd.) R.Brown	Splmai	Asclepidaceae	July-November	CHP	MSP	-	-
100	<i>Cotoneaster microphylla</i> Wall. ex Lindley	Kharawa	Rosaceae	April-May	THP	MIC	+	CGS
101	<i>Cotoneaster nummularia</i> Fisch. & Meyer	Mamanrha	Rosaceae	April-May	THP	MIC	+	CGS
102	<i>Colerbrookea oppositifolia</i> Smith	Unknown	Lamiaceae	March-April	NPP	MSP	-	-
103	<i>Daphne mucronata</i> Royle	Leghunai	Thymelaeaceae	April-September	THP	MIC	-	-
104	<i>Datura stomonium</i> L.	Batoora	Asteraceae	June-July	NPP	MSP	-	-
105	<i>Daphne oloides</i> auct. non Schreber: Boiss	Leghunai	Thymelaeaceae	April-September	THP	MIC	-	-
106	<i>Debregeasia salicifolia</i> (D. Don) Rendle	Unknown	Utracraeae	April-September	NPP	MIP	+	CGBS
107	<i>Dodonaea viscosa</i> (L.) Jacq.	Ghoraskay	Sapindaceae	March-june	NPP	MSP	-	-
108	<i>Gymnosporia royleana</i> Wall. ex M.A. Lawson	Soor azghay	Celastereae		NPP	MIC	+	CGS
109	<i>Hypericum dyeri</i> Rehder	Ziaray	Guttiferae		THP	MIC	-	-
110	<i>Hypericum perforatum</i> Linn.	Shenchai	Hypericaceae/Guttiferae	Juune-september	THP	LTP	-	-
111	<i>Indigofera heterantha</i> (Brandis.) Baker	Ghwareja	Papilionaceae	May-june	NPP	LTP	-	-
112	<i>Jasminium humile</i> Linn.	Rambeel chambeel	Oleaceae	April-June.	NPP	MIP	+	CGS
113	<i>Jasminium officinale</i> Linn.	Rambeel chambeel	Oleaceae	April-August	NPP	MIP	+	CGS
114	<i>Justicia adhatoda</i> L.	Bakanrha	Acanthaceae	November-April	NPP	MIC	-	-
115	<i>Malvastrum coromendelianum</i> (L.) Garcke	Unknown	Malvaceae	April-August	HMP	MIC	+	CGS
116	<i>Maytenus willichiana</i> (Springe) Raju & Bull.	Janglargai/Bampor	Celastereae	April-August	HMP	MIC	+	CGBS
117	<i>Mirabilis jalapa</i> Linn.	gule abbasi /gule dawoodi	Nyctaginaceae	August-Decem	THP	MSP	-	-
118	<i>Myrtus communis</i> L.	Unknown	Myrtaceae	July-September	THP	MSP	+	CGS
119	<i>Nerium oleander</i> L.	Ganderai	Apocynaceae	June-Aug	PNP	MIC	-	-
120	<i>Nerium indicum</i> Mill.	Ganderai	Apocynaceae	June-Aug	NPP	MIC	-	-
121	<i>Oetostegia limbata</i> (Benth.) Boiss.	Speen-azghay	Lamiaceae	April-June	CH	MSP	-	-
122	<i>Opuntia monacantha</i> (Willd) Ham.	Zooqam	Cactaceae	April-May	NPP	LTP	-	-
123	<i>Periploca aphylla</i> Decne.	Barara	Asclepiadaceae	Spring-May	NPP	LTP	-	-
124	<i>Phragmites australis</i> (Cav.) Trin ex Steud.	Shar-ghashay	Poaceae	Aug-Septem	GEP-Hyd	MSP	+	CG
125	<i>Rabdosia rugosa</i> (Wallich ex Benth.) Hara	Sperkai	Lamiaceae	April-June	NPP	MIC	-	-
126	<i>Reinwardtia trigyna</i> (Roxb.) Plan	Ziaray	Linaceae	April-May	GEP	MSP	-	-
127	<i>Rumex hastatus</i> D. Don	Tarookay	Polygonaceae	April-May	THP	NPL	+	CGBS
128	<i>Saccharum spontaneum</i> L.	Qalamai / Durma	Poaceae	July-september	GEP	MIC	-	-
129	<i>Trachelospermum lucidum</i> (D. Don) Schum.	Unknown	Apocynaceae	April-July	NPP	MIC		
130	<i>Viscum album</i> Linn.	Melma	Loranthaceae	March-May	M	LTP		
131	<i>Viscum cruciatum</i> Sieber ex Springe.	Melma	Loranthaceae	April-May	THP			
132	<i>Vitex negundo</i> L.	Marwandai	Verbinaceae	April-May	NPP	NPL	-	-
133	<i>Withania somnifera</i> (L.) Dunal	Kotilal	Solanaceae	April-May	CHP	MSP	-	-
134	<i>Zanthoxylum aromaticum</i> D.C	Dambra	Rutaceae	April-May	NPP	MSP	+	G
135	<i>Ziziphus nummularia</i> (Burm. f.) Wight & Arn.	Karkanrha	Rhamnaceae	May-June	NPP	MIC	+	CGS

	Tree							
136	<i>Acaia modesta</i> Wall.	Paloosa	Mimosaceae	March-May	MPP	LEP	+	CGS
137	<i>Acacia nilotica</i> (Linn.) Delile	Paloosa	Mimosaceae	March-Aug	MPP	LEP	+	CGS
138	<i>Ailanthus altissima</i> (Mill.) Swingle	Spena shandai	Simaroubaceae	Jun-July	MGP	MIC	+	CGBS
139	<i>Betula utilis</i> D. Don	Brooj	Betulaceae	May-June	MGP	MSP		
140	<i>Cedrus deodara</i> (Rox. Ex. D. Don) G. Don	Diar	Pinaceae	May-June	MGP	LTP	-	-
141	<i>Celtis caucasica</i> Willd.	Thaughau	Ulmaceae	April-July	PNP	MSP	+	CGS
142	<i>Cotoneaster microphylla</i> Wall. ex Lindley	Kharawa	Rosaceae	April-July	PNP	NPL	+	CGS
143	<i>Cotoneaster nummularia</i> Fisch. & Meyer	Mammana	Rosaceae	April-July	PNP	NPL	+	CGBS
144	<i>Dalbergia sissoo</i> Roxb.	Shwa	Papilionaceae	March-May.	MPP	NPL		
145	<i>Diospyrus lotus</i> L.	Toor amlook	Ebenaceae	Septem-October	MGP	MIC	+	CGBS
146	<i>Eucalyptus lanceolatus</i>	Lachi	Myrtaceae	March-Aug	CHP	MIC	-	-
147	<i>Ficus palmata</i> Forssk.	Sharai Inzar	Moraceae	May-November	MGP	MSP	+	CGBS
148	<i>Ficus carica</i> L.	Inzar	Moraceae	Jun-July	NPP	MSP	+	CGBS
149	<i>Grewia optiva</i> Drum. ex. Burret	Parparak/Pastawoonay	Tiliaceae	April-May	MGP	MIC	+	CGBS
150	<i>Juglans regia</i> Linn.	Ghooz	Juglandaceae	April-May	MGP	MCP	-	-
151	<i>Melia azedarach</i> Linn.	Bakana /watani shandai	Meliaceae	April-May	MPP	NPL	+	CGBS
152	<i>Monothea buxifolia</i> (Falc.) A. DC.	Gorgora	Sapotaceae	April-May	PHP	MIP	+	G
153	<i>Morus alba</i> L.	Speen toot	Moraceae	April-May	MGP	MSP	+	CGBS
154	<i>Morus nigra</i> L.	Toor toot	Moraceae	April-May	MGP	MSP	+	CGBS
155	<i>Olea ferruginea</i> Royle	Khuna, zaitoon	Oleaceae	April-May	MPP	MIC	+	CGS
156	<i>Pinus ruxburghii</i> sargent	Nakhtar	Pinaceae	May-June	MGP	LTP	-	-
157	<i>Pinus willichiana</i> A. B. Jackson	Nakhtar	Pinaceae	May-June	MGP	LTP	-	-
158	<i>Punica granatum</i> L.	Annan gorhay	Punicaceae	April-May	PNP	NPL	+	CGS
159	<i>Platanus orientalis</i> L.	Chinaar	Plantanaceae	April-June	MGP	MCP	+	CGBS
160	<i>Pyrus pashia</i> Buch-Ham ex. D. Don	Tangoo	Rosaceae	March-April	MGP	MSP	+	CGBS
161	<i>Quercus dilatata</i> lindl. ex Royle	Serai, pircgay, speen banj	Fagaceae	April-May	MGP	MIC	+	CGBS
162	<i>Quercus incana</i> Roxb.	Serai, pircgay, toor banj	Fagaceae	April-May.	MGP	MIC	+	CGBS
163	<i>Ricinus communis</i> L.	Aranda	Euphorbiaceae	Through out year	NPP	MEG	-	-
164	<i>Robinia pseudo-acacia</i> Linn.	speen kikar	Fabaceae	April-May	MGP	MIP	+	CGBS
165	<i>Tamarix aphylla</i> (L.) Karst	Ghaz	Tamaricaceae	June-October	MGP	LTP	-	-
166	<i>Ziziphus jujuba</i> Mill.	Markhany	Rhamnaceae	June-July	NPP	MIC	+	G
167	<i>Ziziphus oxyphylla</i> Edgew.	Innalai	Rhamnaceae	June-Septem	PNP	MIC	+	GS

Key Notes

Life form: THP= Therophytes, HMP= Hemicryptophytes, CHP= Chaemophytes, NPP= Nanophenerophytes, PNP= Penerophytes, MPP= Microphenerophytes, GEP= Geophytes, Hyp= Hydophytes, CRP= Criptophytes.

Leaf form: MIC= Microphyll, MEG= Megaphyll, MSP= Mesophyll, MCP= Macrophyll, NPL= Nanophyll, LTP= Leptophyll, APL= Aphyllous.

Palatability: + = Palatable, - = Non palatable, C= Cow, G= Goat, S= Sheep, B= Buffa

4. Discussion

Life forms of various species recorded from Arang Sire Ghar were classified into major life forms. A bio spectrum is formed when all the species of higher plants are classified into life forms and their ratio expressed in number or percentage (Saxina *et al.*, 1987) ^[15]. Biological spectra are useful in comparing geographically widely separated plant communities and are also regarded as an indicator of prevailing environment. Occurrence of similar biological spectrum in different regions indicates similar climatic conditions. According to Raunkiaer (1934) ^[14] the climate of a region, is characterized by life form, while in biological spectrum of the region exceeds the percentage of the same life form. However, due to biological disturbance the proportion of life forms may be altered. Biological spectrum may be materially changed due to introduction of therophytes like annual weeds, due to biotic influences like agricultural practices and grazing, deforestation and trampling etc. The dominance of therophytes (16 spp., 29.6%) in the study area indicated that the investigated area was under heavy biotic pressure due to deforestation and over grazing. Generally, they were more abundant in the spring as it reflected spring aspect. Leaf size spectrum of the plant exposed that Mesophyll species followed by microphyllous species. Steppes are Microphylls are usually, while leptophylls and nanophylls are showed by of hot deserts (Tareen & Qadir, 1993, Cain and Castro, 1959) ^[18, 6]. The present investigation displays that microphylls and nanophylls were present in high altitudes (1500 m) and leptophylls were high at the foot hills. There are always a flush of annuals during spring, which gives an outlook to the community (Malik & Hussain 1990, Shimwell 1971) ^[12, 16]. Similar trend regarding prevalence of therophytes was observed by (Hussain *et al.*, 1997). (Saxina *et al.*, 1987) ^[15] stated that Hemicryptophytes ruled alpine and temperate zones in overlapping and loose continuum. Therophytes survive under adverse condition through seeds production. The predominance of therophytes in variable conditions such as dry, hot or cold met for low to higher elevation might be the reason for their higher percentage in the present study (Qadir and Shetvy 1986). A high percentage of microphylls might be due to dry climate in subtropical area. Here the soil was poorly developed with thin sheet that prevented root penetration. Furthermore, roots absorb low moisture and nutrients under dry conditions. In subtropical regions the plant face drought during winter especially in dry soil. The species with microphyllous leaves were abundant due to ecological adaptation for these arid conditions. The present findings agree with those of (Qadir and Tareen, 1987) who reported high percentage of microphylls in the dry temperate climate of Quetta district. These data indicated that the percentage of various leaf form classes varied with increasing altitude. (Saxina *et al.*, 1987) ^[15] also observed that the percentage of microphylls was positively related with the increasing altitude and this also support our findings. However, in the tropical wet forest, as reported by (Dolph and Dilcher 1980) ^[7], large leaved species were dominant.

5. References

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